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STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			EXAMINER BELLO, AGUSTIN	
			ART UNIT 2633	PAPER NUMBER 20
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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Paper No. 20

Application Number: 09/248,103  
Filing Date: February 11, 1999  
Appellant(s): NAKAZAWA ET AL.

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Paul I. Kravetz  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 10/7/03.

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**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) *Summary of Invention***

The summary of invention contained in the brief is correct.

**(6) *Issues***

The appellant's statement of the issues in the brief is correct.

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**(7) Grouping of Claims**

Appellant's brief includes a statement that claims 1-89 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

**(8) Claims Appealed**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) Prior Art of Record**

Gaudino, R. "A Novel AOTF-Based Multichannel Add-Drop Node and its Cascadability in WDM Ring Networks" ECOC '97 Conference Publication No. 448, (Sept. 22-25, 1997), pp. 77-80

6,031,852	THOMPSON et al.	2-2000
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4,906,064	CHEUNG	3-1990
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**(10) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-15, 18-22, 25-32, 35-59, 62-68, and 71-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaudino's article "A Novel AOTF-Based Multichannel Add-Drop Node and its Cascadability in WDM Ring Networks" in view of Thompson (U.S. Patent No. 6,031,852).

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Regarding Claims 1, 3, 4, 6-9, 35-36, 39-40, 43-45, 48-50, 59, 78, 79, 80, 86, 87, 88, 89, Gaudino teaches an apparatus comprising: first and second acousto-optical tunable filters (AOTF) cascaded together so that the second filter filters light output from the first filter (see Figure 1), the first and second filters having filtering characteristics controlled in accordance RF signals applied thereto (as noted by Gaudino in the last paragraph of page 77). Gaudino differs from the claimed invention in that Gaudino fails to specifically teach that the phase of a beat generated by the RF signals applied to the first optical filter is different than a phase of a beat generated by the RF signals applied to the second optical filter. However, Thompson, in the same field of endeavor, teaches it is well known in the art to change the phase of the RF signal input to a pair of cascaded AOTFs, thereby inherently teaching that the beats produced in each of the filters have different phases (column 6 lines 2-13). Thompson teaches that the doing so provides higher efficiency over a wide range of acoustic frequencies and deflection angles. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have allowed the phase of a beat generated by the RF signals applied to the first optical filter to be different than a phase of a beat generated by the RF signals applied to the second optical filter in order to increase efficiency over a wide range of acoustic frequencies and deflection angles.

Regarding Claims 2, 5, 37, 41, the combination of Gaudino and Thompson would have suggested to one skilled in the art that it would have been beneficial to have allowed the phase of a beat generated by the RF signals applied to the first optical filter to be different than a phase of a beat generated by the RF signals applied to the second optical filter in order to increase efficiency over a wide range of acoustic frequencies and deflection angles. Being that

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Thompson teaches an RF source that allows the phase of the input RF signal to be shifted, one skilled in the art would clearly have recognized that it would have been possible to adjust the phase difference between the beats created to any angle desired, including a value obtained by dividing  $180^\circ$ . Doing so would have involved only routine skill or experimentation for one skilled in the art. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have made the difference in the phase of the beats generated equal to any value desired.

Regarding Claims 10, 18, 53, 62, 64, the combination of Gaudino and Thompson teach cascading a first and second AOTF, and Gaudino further suggests that greater than two AOTFs could be cascaded (second paragraph of page 79). However, the combination of references fails to specifically teach a third AOTF cascaded with the first and second AOTFs for filtering the second output light in accordance with RF signals applied to the third optical filter for controlling filtering characteristics of the third optical filter, wherein a phase of a beat generated by the RF signals applied to the first optical filter is different than a phase of a beat generated by the RF signals applied to the second optical filter and a phase of a beat generated by the RF signals applied to the third optical filter. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have cascaded a plurality of filters, thereby allowing each filter to extract a particular wavelength or group of wavelengths. One skilled in the art would have been motivated to cascade a third, fourth or fifth filter to filter the second output of the first filter in order to provide a higher degree of accuracy in the extraction of a particular wavelength or group of wavelengths by narrowing the filter passband of the third filter so that the output of the filter only included the desired wavelength or group of

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wavelengths. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have cascaded a third optical filter from the first optical filter wherein the third optical filter creates a beat with a phase that is different from the phase of the beat created by the first filter since doing so would have provided a more accurate filter as suggested by the teachings of the combination of Gaudino and Thompson and since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art, *St. Regis Paper Co. of v. Bemis Co., 193 USPQ*.

Regarding Claim 11, 54, 63, as discussed above, the combination of Gaudino and Thompson would have suggested to one skilled in the art that it would have been possible to select and desired phase difference for the beats generated by the RF signals applied to AOTFs, being that Thompson specifically teaches the ability and mechanism to adjust the phase of the input RF signal to the AOTF. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have selected the phase between the beats generated by the RF signals to have had the same.

Regarding Claim 12-14, 19-21, 55-57, and 66-68, the combination of Gaudino and Thompson teach cascading a plurality of AOTFs, , the AOTFs being controllable by RF signals which select particular wavelengths from a light passing therethrough. One skilled in the art would clearly have recognized that it would have been possible to selected or reject any desired wavelength passing through the AOTF by selecting the appropriate RF signal. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to selected or rejected an desired wavelength in any of the cascaded filters by selection of the appropriate RF signal.

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Regarding Claim 15, 22, Gaudino teaches the first output light excludes at least two wavelengths and the second output light from the first optical filter includes the selected wavelengths (see Figure 1).

Regarding Claim 25, 31, 71, 81, 84, 85, the combination of Gaudino and Thompson teach cascading a first and second AOTF, and Gaudino further suggests that greater than two AOTFs could be cascaded (second paragraph of page 79). Thompson also teaches a phase controller controlling the phase of the RF signal applies to the first and second optical filters (inherent in the RF generator of column 6 lines 2-13). However, the combination of references fails to specifically teach a third AOTF cascaded with the first and second AOTFs for filtering the second output light in accordance with RF signals applied to the third optical filter for controlling filtering characteristics of the third optical filter, wherein a phase of a beat generated by the RF signals applied to the first optical filter is different than a phase of a beat generated by the RF signals applied to the second optical filter and a phase of a beat generated by the RF signals applied to the third optical filter. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have cascaded a plurality of filters, thereby allowing each filter to extract a particular wavelength or group of wavelengths. One skilled in the art would have been motivated to cascade a third, fourth or fifth filter to filter the second output of the first filter in order to provide a higher degree of accuracy in the extraction of a particular wavelength or group of wavelengths by narrowing the filter passband of the third filter so that the output of the filter only included the desired wavelength or group of wavelengths. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have cascaded a third optical filter from the first optical filter wherein the



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third optical filter creates a beat with a phase that is different from the phase of the beat created by the first filter since doing so would have provided a more accurate filter as suggested by the teachings of the combination of Gaudino and Thompson and since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art, *St. Regis Paper Co. of v. Bemis Co.*, 193 USPQ.

Regarding Claim 26, 27, 32, 46, 51, 72, 73, 82, 83, the combination of Gaudino and Thompson teach a phase controller which controls the phases of the RF signals input to the AOTFs. One skilled in the art would clearly have recognized that it would have been possible to set the phase difference between the AOTFs to any desired difference including setting the phase difference to be the same for each AOTF.

Regarding Claim 28-30, 74-77, the combination of Gaudino and Thompson teach cascading a plurality of AOTFs, , the AOTFs being controllable by RF signals which select particular wavelengths from a light passing therethrough. One skilled in the art would clearly have recognized that it would have been possible to selected or reject any desired wavelength passing through the AOTF by selecting the appropriate RF signal. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to selected or rejected an desired wavelength in any of the cascaded filters by selection of the appropriate RF signal.

Regarding Claim 38, 42, 47, 52, 58, 65, Gaudino teaches setting a first and second RF frequency to be the same (see Figure 1).

3. Claims 16, 17, 23, 24, 33, 34, 60, 61, 69, and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaudino's article "A Novel AOTF-Based Multichannel Add-Drop Node

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and its Cascadability in WDM Ring Networks” in view of Thompson (U.S. Patent No. 6,031,852) and Cheung (U.S. Patent No. 4,906,064).

Regarding Claim 16, 23, 33, 60, 69, the combination of references differs from the claimed invention in that it fails to specifically teach that the cascaded AOTFs are formed on the same substrate and that a reflective element is incorporated onto the same substrate. However, one skilled in the art would clearly have recognized that incorporating a plurality of elements onto a single substrate would have reduced the size of the system and overall cost of producing the system. Cheung, in the same field of endeavor, teaches it is well known to cascade a plurality of AOTFs with a plurality of reflective devices in order to form a switching system wherein an optical signal filtered by a first AOTF is reflected to a third AOTF, while a signal transmitted by the first AOTF is filtered by a second AOTF. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have cascaded a plurality of AOTFs and reflective devices as taught by Cheung in order to create a switching system and to have produced these elements on the same substrate in order to reduce the size and cost of the system.

Regarding Claim 17, 24, 34, 61, 70, the combination of references and Cheung in particular teach that the filtered signals are prevented from being reflected back to the first optical filter being that the reflection of the signals is polarization dependent.

**(11) Response to Argument**

The examiner has rejected claims 1-15, 18-22, 25-32, 35-59, 62-68, and 71-89 under 35 USC 103 as being unpatentable over Gaudino in view of Thompson. Gaudino, in Figure 1, clearly teaches an apparatus comprising first and second acousto-optical tunable filters (AOTF)

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cascaded together so that the second filter filters light output from the first filter, the first and second filters having filter characteristics controlled in accordance with RF signals applied thereto. Gaudino differs from the claimed invention in that Gaudino fails to specifically teach that the phase of the beat generated by the RF signals applied to the first optical filter is different than the phase of the beat generated by the RF signal applied to the second optical filter. The examiner relies on the disclosure of Thompson to show the obviousness of this feature.

Thompson teaches that it is well known in the art to provide a difference in the phase of the RF signals input to a pair of cascaded acousto-optical devices, thereby inherently teaching that the beats produced in each of the filters also have different phases.

The applicant argues against the combination of references by contending that the disclosure of Thompson is significantly different than and non-analogous to the disclosure by Gaudino. However, before deeming the Thompson reference non-analogous art it must be decided whether the reference is within the field of the inventor's endeavor. The examiner believes that the Thompson reference is clearly within the field of the inventor's endeavor, namely the field of optical communication. Furthermore, the Thompson reference is reasonably pertinent to the particular problem with which the inventor was involved in that Thompson pertains to the application of RF signals to acousto-optical devices and the effects of such an application on optical signals passing through the acousto-optical devices. The disclosure of Thompson provides a solution to the same problem faced by the applicant in the use of acousto-optical devices: obtaining a higher efficiency over a wide range of acoustic frequencies. Thompson, much the same as the applicant, solves this problem by providing a difference in the phases of the RF signals input to a pair of cascaded acousto-optical devices, thereby producing

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beats in each of the devices having different phases. As such it is clear that the Thompson reference is not non-analogous being that the Thompson reference suffers from the same problem as that of the applicant and Thompson solves the problem in substantially the same manner as the applicant.

Next, the applicant argues that Gaudino and Thompson are unrelated being that Gaudino teaches filtering of WDM light while Thompson teaches deflection of laser light. However, the fact remains that both references deal with the application of RF signals to acousto-optical devices and the effects of doing so on optical communication signals passing through the acousto-optical devices. Furthermore, the examiner relies on Thompson to show that it would have been obvious to one skilled in the art at the time the invention was made to provide a difference in the phase of the RF signals input to a pair of cascaded acousto-optical devices, thereby producing beats in each of the devices having different phases. The examiner does not rely on Thompson to disclose filtering of a WDM signal via an acousto-optical device since Gaudino meets these limitations.

The applicant further argues that the broad descriptions used by the examiner to describe the devices of the references ignore the particular fields in which the inventions are intended. Although the applicant's descriptions of the fields in which the inventions can be classified are correct, they are not the only fields applicable. It is clear that the inventions could also be intended for use in the field of acousto-optic devices or optical communication. Therefore, the examiner has not ignored the particular fields in which the inventions are intended, but instead has given the broadest reasonable interpretation to the inventions and their disclosures.

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In response to the applicant's argument that the cited portion of Thompson should not be combined with the Gaudino since Gaudino teaches AOTFs while Thompson teaches AODs (acousto-optical deflectors), the examiner does not rely on Thompson for anything other than to show that it is well known in the art to provide a difference in the phase of the RF signals input to cascaded acousto-optical devices, thereby inducing the beats produced in each of the filters to have different phases. Gaudino meets all the other limitations of the claimed invention except the limitations regarding the beats produced within the acousto-optical device. To meet this deficiency the examiner has relied upon Thompson. As argued in the office action, Gaudino teaches the use of cascaded acousto-optical devices with RF inputs that control the functionality of the acousto-optical device. Thompson teaches that it is well known in the art to provide a difference in the phase of the RF signals input to the cascaded acousto-optical devices, thereby creating a difference in the phase of the beats generated in each of the acousto-optical devices. Therefore, as concluded in the office action, it would have been obvious to one skilled in the art at the time the invention was made to have input RF signals with different phases to the cascaded AOTFs of Gaudino, thereby producing beats within the AOTFs of different phases.

Next, the applicant argues that the examiner has not shown any reference which describes the problem of varying output over time with a conventional AOTF, and has not disclosed any references suggesting that changing the phase of the beats of a multiple-AOTF configuration can provide stable output characteristics over time. In response, it should be noted that the specification is not the measure of invention. Therefore, limitations contained therein cannot be read into the claims for the purpose of avoiding prior art. The applicant's claims are silent to the solving the problem of varying output over time with the result being a stable output over time.

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Regardless, the examiner believes that one skilled in the art, through routine experimentation, would have found settings for the differences in phase of the input RF signals that would have resulted in a stable output characteristic over time.

Regarding the rejection of claims 2, 5, 37, 41, the applicant argues that the examiner has failed to provide a reference or a suggestion in the references relied upon to support the examiner's assertion that it would have been obvious to obtain a difference in the phase of the beats by dividing  $180^\circ$  by the number of stages. However, it is a well known scientific principle that  $180^\circ$  in phase difference causes destructive interference between two waveforms. The examiner believes that one skilled in the art would clearly have recognized that dividing a  $180^\circ$  phase difference by the number of stages would have resulted in cumulative destructive interference for the signals propagating through the acousto-optical devices. The use of a  $180^\circ$  difference in phase is well known concept to those skilled in the art of signal propagation.

Regarding the rejection of claims 10, 12-15, 18-22, 25, 26, 28-30, 53, 55-59, 62, 64-68, 71, 72, and 74-77, the applicant argues that no portion of Gaudino suggests that more than two AOTFs can be cascaded. However, the examiner disagrees. The examiner believes that Gaudino suggests that a signal could be sent through 14 cascaded AOTFs before reaching an unacceptable error threshold based on the experiment shown in Figure 5 of recirculating a signal through the cascaded AOTF configuration up to seven times before reaching an unacceptable error threshold. This suggestion is further supported by Gaudino's disclosure of the experiment as "Cascadability measurements." One skilled in the art would have recognized that it would have made economic, scientific, and common sense to establish the experiment as a microcosm of the larger system instead of building the system to scale then conducting the experiment. The

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examiner believes that Gaudino, instead of cascading 14 AOTFs, simply recirculated the same signal through two cascaded AOTFs to determine the final number of cascadable AOTFs. In doing so Gaudino effectively simulated passing a signal through 14 cascaded AOTFs without the cost of actually cascading 14 AOTFs. As such it is clear that Gaudino suggests that up to 14 AOTFs can be cascaded before an unacceptable error threshold is reached. Furthermore, the examiner believes that one skilled in the art would clearly have recognized that the AOTFs could have been cascaded in any number of different configurations, including a configuration wherein a second AOTF filters a first light from a first output from the first AOTF and a third AOTF filters a second light from a second output of the first AOTF.

Regarding the rejection of claim 11, 27, 54, 63, and 73, the applicant argues that the use of the same phase for the second and third AOTFs are neither disclosed nor suggested by the cited art. However, the examiner believes that it would have been obvious to one skilled in the art to have selected a same phase for the second and third AOTF being that the combination of Gaudino and Thompson provide the suggestion and mechanisms to adjust the phase of the input RF signals. Clearly, one skilled in the art would have recognized the ability to set the phase of the AOTFs to which ever phase difference was desired, including no phase difference.

Regarding the rejection of claim 31, 32, 81, and 84, the applicant argues that the use of first through fifth cascaded optical filters is neither disclosed nor suggested by the cited art. However, the examiner maintains that Gaudino suggests that up to 14 AOTF could be cascaded before an unacceptable error threshold would be reached. Furthermore, the examiner believes that one skilled in the art would have recognized that the plurality of AOTFs could have been cascaded in a plurality of different configurations including that claimed by the applicant.

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Regarding the rejection of claims 82, 83, and 85, the applicant argues that the use of a plurality of different phases for the plurality of individual AOTFs is neither disclosed nor suggested by the cited art. However, the examiner believes that it would have been obvious to one skilled in the art to have selected any phase desired for any of the cascaded AOTFs being that the combination of Gaudino and Thompson provide the suggestion and mechanisms to adjust the phase of the input RF signals.

Regarding the rejection of claims 16, 17, 23, 24, 33, 34, 60, 61, 69, and 70, the applicant argues against the combination of Gaudino, Thompson, and Cheung by stating that no portion of Cheung discloses or suggests forming a plurality of elements on a single substrate. However, the examiner believes that integration of a plurality of elements onto a single substrate is very well known in the art and would have been obvious to one skilled in the art. Furthermore, Cheung discloses the use of integrated optical devices, thereby suggesting a plurality of optical devices integrated on a single substrate.

For the above reasons, it is believed that the rejections should be sustained.



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Respectfully submitted,

Agustin Bello  
Examiner  
Art Unit 2633


AB  
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Conferees  
Paul I. Kravetz

STAAS & HALSEY LLP  
700 11TH STREET, NW  
SUITE 500  
WASHINGTON, DC 20001



JASON CHAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600



LESLIE PASCAL  
PRIMARY EXAMINER